

Chapter 4

FOODBORNE ILLNESS SURVEILLANCE

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FOODBORNE ILLNESS SURVEILLANCE

Introduction

Surveillance of foodborne illness serves as the framework from which public health officials can act to control and prevent diseases which can be acquired through food. Surveillance is necessary to determine any significant changes in frequency or distribution of cases. These observations are a continuous process to determine the extent of disease, risk of transmission, and to develop an approach for the prevention and control of illness.

The purpose of this chapter is to outline the information necessary to collect when conducting foodborne illness surveillance, to explain the methods by which this information is collected, and to give several examples about how this information can be used. In addition, a historical perspective on disease surveillance is offered, along with discussions about the limitations of data, timely disease reporting, and confidentiality issues surrounding such reporting.

1) Purpose of Surveillance

Simply stated, surveillance is the regular collection, summarization and analysis of data.

The key to recognizing foodborne illness lies in routine surveillance. How, after all, do you know what is **unusual** if you do not keep track of what happens every day? This point illustrates the importance of prompt reporting. Thus, the purpose of foodborne illness surveillance is to interrupt the transmission of disease to susceptible persons by:

- seeking notification of illness through timely reporting,
- identifying outbreaks, investigating outbreaks, and
- interpreting investigative data and disseminating findings.

2) Historical Development of Surveillance

Current concepts of surveillance evolved from earlier public health activities. In the late Middle Ages, governments in Western Europe began to assume responsibility for health protection in towns and cities. A simple system of monitoring illness led to regulations against polluting streets and public water, and proper food handling. An example of the earliest public health action related to surveillance is during the period of bubonic plague when public health authorities boarded ships in the port near the Republic of Venice to prevent persons with plague-like illness from disembarking.

National disease-monitoring activities did not begin in the United States until 1850 when mortality statistics based on death registration and the national census were first published by the Federal Government. A prominent name in the development of public health surveillance at this time was Lemuel Shattuck. Shattuck's *Report of the Massachusetts Sanitary Commission* (1850) was a landmark publication that related death, infant and maternal mortality, and communicable diseases to living conditions.

Massachusetts was the first state to begin systematic reporting of disease in 1874 when the Massachusetts State Board of Health instituted a voluntary plan for weekly reporting of prevalent diseases by physicians, using a standard postcard-reporting format. By 1901, all states required notification from physicians to local authorities of selected communicable diseases such as smallpox, tuberculosis, and cholera. It was not however, until 1925 that all states were participating in the national reporting of infectious disease.

The Council of State and Territorial Epidemiologists (CSTE) was authorized in 1951 by its parent body, the Association of State and Territorial Health Officials (ASTHO), to recommend what diseases should be reported by states to the U.S. Centers for Disease Control and Prevention (CDC). The CSTE meets annually and recommends appropriate changes in morbidity reporting and surveillance, including what diseases should be reported to CDC. This information is published in the *Morbidity and Mortality Weekly Report (MMWR)* and its supplements.

In Massachusetts, reporting of communicable diseases is required under **Massachusetts General Law, Chapter 111, Sections 3, 6, 7, 109, 110 and 112**. These laws are implemented by regulation under **Chapter 105, Code of Massachusetts Regulations (CMR), Section 300 et seq: Reportable Diseases and Isolation and Quarantine Requirements**. The purpose of these regulations is “to list those diseases declared dangerous by the MA Department of Public Health, and to establish reporting, isolation and quarantine requirements. This is intended for use by local boards of health, hospitals, physicians, educational and recreational program health officials, food industry officials, and the public.” (See *Diseases Reportable By Healthcare Providers* at the end of this chapter.)

In Massachusetts, local boards of health or their designee (often local Visiting Nurse Associations) are authorized to accept, investigate and submit reportable disease case information to the MA Department of Public Health, Bureau of Communicable Disease Control. Certain conditions such as AIDS, tuberculosis (in most cities and towns) and sexually transmitted diseases are directly reportable by health care providers and laboratories to the Bureau of Communicable Disease Control (see Figure 4.3 - Massachusetts Reportable Disease Surveillance System). Summary information on nationally-notifiable diseases is submitted to the CDC on a weekly basis (without personal identifiers). This information is used to track national and regional disease trends.

3) Information You Need To Collect

Two main categories of information should be collected as part of a foodborne illness surveillance system: **Descriptive Information** and **Investigational Findings**.

A. Descriptive Information.

First, information is needed regarding the time(s), place(s), and person(s) connected with a particular complaint. Collecting this descriptive information will enable one to decide whether a complaint is valid (see Chapter 5, Section 3). For example, when notified of a potential foodborne illness, one should gather the following information:

WHO, WHEN, WHAT, WHERE

- **WHO** became ill and what are the characteristics of this person(s) (age, sex, occupation)?
- **WHEN** did the person(s) become ill?
- **WHAT** foods, beverages, or meals are suspect? (See “Guidelines For Determining Suspect Foods” below)
- **WHERE** did the ill person(s) eat or purchase these foods and **when** did they consume them?

These data and other information should be collected using the standardized *Foodborne Illness Complaint Worksheet*. A detailed explanation of the worksheet is provided in Section 4 of this chapter.

NOTE: A copy of the *Foodborne Illness Complaint Worksheet* can be obtained by calling the MDPH Division of Epidemiology at 617-983-6800 or the Food Protection Program at 617- 983-6712.

BOX 4.1 - Guidelines For Determining Suspect Foods

- I. Only **one person** is reported ill.
 - a) If cause (organism) is **NOT KNOWN**: determine foods/beverages/meals consumed for **at least 72 hours prior to the onset of illness**.
 - b) If cause (organism) is **known**: determine foods/beverages/meals which were consumed during the appropriate incubation period prior to the onset of illness (for appropriate incubation periods, please refer to Chapter 2, Table 2.3 or Table 2.5).
- II. **Two or more persons** are reported ill.
 - a) If cause (organism) is **NOT KNOWN**: determine foods/beverages/meals **COMMON** to all persons for **at least 72 hours prior to the onset of illness**.
 - b) If cause (organism) is **known**: determine foods/beverages/meals **COMMON** to all persons which were consumed during the appropriate incubation period prior to the onset of illness (for appropriate incubation periods, please refer to Chapter 2, Table 2.3 or Table 2.5).

B. Investigational Findings

Based on the information from above, a foodborne illness investigation may be initiated. A second category of information will be collected as an investigation proceeds. These investigational findings are a crucial component of a foodborne illness surveillance system because such findings enable public health officials to more clearly understand the causes of foodborne illness. Findings may include the answers to some or all of the following questions:

- **What** specific food item(s) or ingredient(s) was linked to the illness?
- **What** type of contaminant (bacterium, virus, parasite, toxin or chemical) caused the illness?
- **What** were the factors leading to the contamination, survival, or growth of a particular contaminant in an implicated food item? (Was the item improperly cooked or stored? Did a sick food handler prepare food?)

4) How To Collect Information

The most direct method for collecting information regarding a potential foodborne illness is to complete a *Foodborne Illness Complaint Worksheet* when a complaint is received (see Figure 4.2 - Recording a Complaint About a Possible Foodborne Illness). This is the quickest way in which to identify and respond to a suspect foodborne illness.

NOTE: The Working Group on Foodborne Illness Control (WGFIC) at the Massachusetts Department of Public Health strongly encourages local boards of health to use the *Foodborne Illness Complaint Worksheet*. It will help assure that the pertinent information is gathered during the initial interview.

Another method for collecting information regarding potential foodborne illnesses is through the routine follow-up of reportable diseases. Several of the reportable illnesses that can be acquired through foods, such as laboratory-confirmed *Salmonella*, *Campylobacter*, and *E. coli* infections must be reported to the local boards of health. Local health departments collect information about the cases and forward the information on *case report forms* to the Massachusetts Department of Public Health (MDPH) (see Figure 4.3 - Massachusetts Reportable Disease Surveillance System).

Both methods of collecting foodborne illness surveillance information are discussed below.

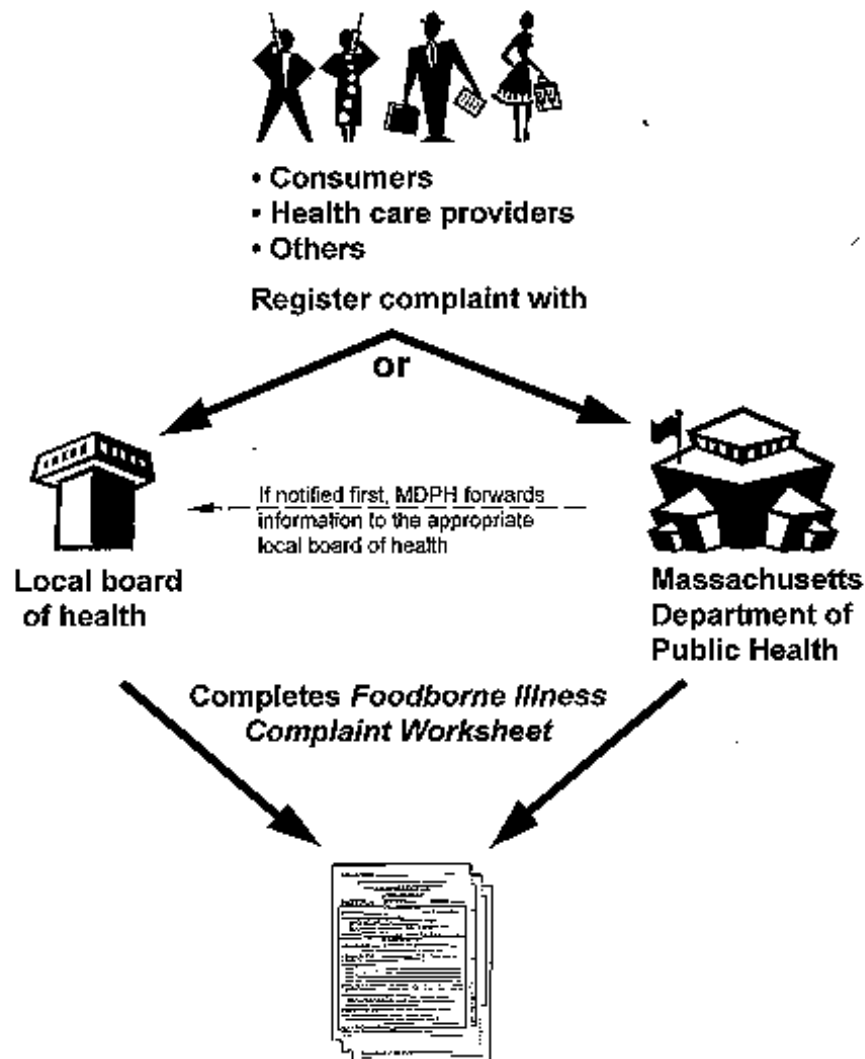
A. The *Foodborne Illness Complaint Worksheet*

As outlined in the current (1994) **Reportable Diseases and Isolation and Quarantine Requirements (105 CMR 300.120)**, any illness, regardless of whether or not it is a reportable illness, that is believed to be caused by the consumption of food must be reported to local boards of health by health care providers and those in supervisory positions at a school, day care, hospital, institution, clinic, medical practice, laboratory, labor or other camp. However, complaints of possible foodborne illness are also reported by consumers, neighboring health officials, and restaurant owners.

No matter who reports a potential foodborne illness, the *Foodborne Illness Complaint Worksheet* should be used to record all information and should be filed as a permanent record of the complaint. Remember, if investigating a report of possible foodborne illness in which a reportable illness has been confirmed (e.g., salmonellosis), an official *case report form* must be completed **in addition to** the *Foodborne Illness Complaint Worksheet*.

When completing the *Foodborne Illness Complaint Worksheet*, please keep the following factors in mind:

Figure 4.2 Recording a Complaint About a Possible Foodborne Illness



1) Always try to **collect as much information as possible** from the complainant the first time contact is made. It might be difficult to contact this individual again. If the complainant cannot provide critical pieces of information, then try to find out who may be able to and contact that person. By collecting enough information in the initial stages, you will be able to determine the validity of the complaint more easily (see Chapter 5, Section 3), and possibly avoid conducting an unnecessary investigation.

2) **A laboratory diagnosis is not required for a foodborne illness complaint to be legitimate.** The complainant may have been infected through food, but may have not received medical care. Also, remember that many foodborne illnesses (for example, those caused by viruses), are not reportable and are difficult to diagnose in the laboratory.

3) Remember that many illnesses that can be acquired through foods may also be acquired through other means, such as water, person-to-person contact, and animal-to-person contact. In addition, a complainant may be “sure” about the source of the illness and report only one suspect food or food establishment. Do not be deterred from obtaining an appropriate food consumption history. (See Box 4.1 - Guidelines For Determining Suspect Foods in Section 3 of this chapter.)

4) Be sure to **accurately record dates and times** of the onset of illness, dates and times of food consumption, and symptom information. Most people who have experienced a recent illness should be able to provide you with these answers. If they can not, try to find out why.

5) The completed worksheets should be filed at the LBOH for easy retrieval. This will facilitate the identification of specific complaints or possibly related complaints during certain time periods.

NOTE: Any foodborne illness complaint that is initially received at the state level will be forwarded to the appropriate local board of health via phone or fax.

NOTE: Although it is not mandatory, the MDPH Working Group on Foodborne Illness Control is requesting the LBOH to send a copy of completed *Foodborne Illness Complaint Worksheets* to the MDPH. (Remember to also keep a copy on file at the LBOH.)

When complaints are received at the state level, the WGFIC enters the *Foodborne Illness Complaint Worksheet* information into a computer database. Use of this database greatly facilitates finding, reviewing, and analyzing records. If the board of health currently has or soon will have access to a computer and would be interested in using this system, please refer to section 6-C of this chapter for additional information.

Where to send the *Foodborne Illness Complaint Worksheet*

Promptly send completed worksheets in envelopes marked “**Confidential**” to:

Food Protection Program
Massachusetts Department of Public Health
State Laboratory Institute
305 South Street
Jamaica Plain, MA 02130

B. Massachusetts Reportable Disease Surveillance System

Reporting is the activity whereby a surveillance system receives a timely and regular flow of information on cases of illness. As mentioned earlier, certain reportable diseases in Massachusetts can be acquired through food. Most of these are gastrointestinal illnesses, for example salmonellosis, and **once confirmed must be reported by local boards of health to the MDPH** using the *Bacterial/Parasitic Gastroenteritis Case Report Form*. Several *case report forms* are available for other reportable diseases which can be foodborne, such as listeriosis, trichinosis, and toxoplasmosis. Again, a listing of all reportable diseases and reporting requirements can be found in **105 CMR 300: Reportable Diseases and Isolation and Quarantine Requirements**.

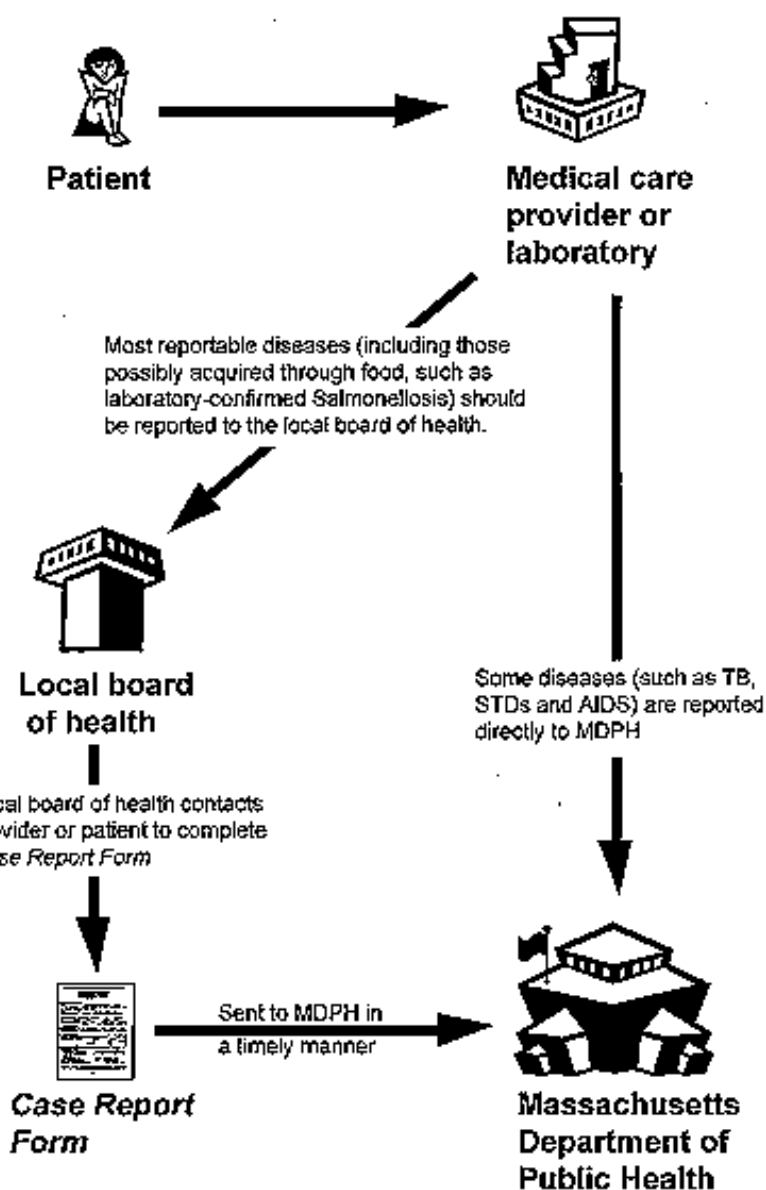
NOTE: A completed *Foodborne Illness Complaint Worksheet* is **not a substitution** for an official *case report form*.

NOTE: A copy of the *Bacterial/Parasitic Gastroenteritis Case Report Form* (and the *Foodborne Illness Complaint Worksheet*) can be obtained by calling the MDPH Division of Epidemiology and Immunization, Surveillance Program at (617) 983-6801. This form is most commonly used for enteric illness. Other *case report forms* can be obtained by calling this same number.

When a notification of a reportable disease is received from a health care provider, laboratory, or other source besides the MDPH Enteric Laboratory, the case should be reported as soon as possible to the MDPH (see Section 5-A of this chapter). Many of the enteric cases are confirmed at the MDPH Enteric Laboratory and thus the state will first notify the LBOH of a case.

In either situation, the local board of health official or contracted Visiting Nurse Association (VNA) agent, will then begin the task of collecting information requested on the *Bacterial/Parasitic Gastroenteritis Case Report Form* or other appropriate *case report form*. Since initial case reports (from providers, labs, etc.) usually contain minimal information on the case, the completion of a *case report form* is often critical for determining a possible or probable means through which a case may have become infected (e.g., a summer cook-out or consumption of home-made ice cream). In order to begin completion of the *case report form*, it may be necessary to contact the laboratory or provider for the required information to contact the case (address, telephone numbers, etc.).

Figure 4.3 Massachusetts Reportable Disease Surveillance System



Please consider the following points when completing a *Bacterial/Parasitic Gastroenteritis Case Report Form*:

- 1) Be sure to **accurately record dates and times of the onset of illness and symptom information.**
- 2) Please **refer to the correct incubation period range** for the etiologic agent reported (for example, the incubation period range for *Salmonella* is 12-36 hours).
- 3) Once you know the incubation period range, then **ask the case about exposure history during one incubation period range before the illness started** (for example, if the patient had *Salmonella*, ask about exposures during the time period 12-36 hours before the illness started).
- 4) Exposure history:
 - a) Questions about travel history and outdoor activities are asked in order to identify where the patient became infected.
 - b) Questions about animal contact are asked because **certain animals can carry and transmit enteric diseases to humans.** (For example, reptiles can shed *Salmonella* in their feces which can then be transmitted to humans through poor hygiene or food contamination.)
 - c) Information about water usage is collected because **many agents that cause gastrointestinal illness can be transmitted through water.**
- 5) Other questions were designed to examine the case's risk for having either acquired illness from household or day care contacts and the potential for transmitting the illness to these contacts.
- 6) Please keep in mind that food handling not only can refer to restaurant employees, but also **to medical care providers, dental office employees, food processing factory workers, and others** (see the food handler definition in Appendix A, Section 2).
- 7) Attach the lab report to the *case report form*. (Keeping a copy of all forms as complete files on a local level are strongly encouraged.)
- 8) **Promptly send completed case report forms in envelopes marked "Confidential" to:**

Surveillance, Room 511
MA Department of Public Health
State Laboratory Institute
305 South Street
Jamaica Plain, MA 02130

NOTE: See Section 5-A for more information on timeliness with reporting.

NOTE: Individuals collecting case information and completing *case report forms* must ensure that they use the most recent forms available from the MDPH Bureau of Communicable Disease Control. If questions arise about the most recent forms or in completing the forms, investigators should contact the Bureau of Communicable Disease Control, Surveillance Program at (617) 983-6801.

NOTE: If during the completion of a *Bacterial/Parasitic Gastroenteritis Case Report Form* or other *case report form*, it appears possible or likely that food was the source of infection, a *Foodborne Illness Complaint Worksheet* (Section 4-A of this chapter) should be started and the appropriate investigations should be initiated (Chapters 5-7) as with any other foodborne illness complaint.

5) Reporting Issues: Timeliness, Priorities, and Confidentiality

A. Timeliness

Report as soon as possible. As presented in Section 4-B of this chapter, all cases of reportable disease must be reported using a *case report form*. Because the process of obtaining information for a *case report form* can take time, you should initially phone in a report, or send a brief written notification via mail or fax to the Surveillance Program within 24 hours. (See telephone numbers in Box 4.4 below.) Later, one can follow-up with an official *case report form*. As long as the LBOH is notifying the MDPH of cases within 24 hours via mail or fax, most *case report forms* can be sent in on a monthly basis. See the attached *Diseases Reportable By Healthcare Providers* at the end of the chapter for further clarification.

The MDPH Bureau of Communicable Disease Control has an epidemiologist on duty daily to answer your questions. An epidemiologist is also available via beeper during non-work hours for **emergency situations** (e.g., if you receive several complaints and are concerned about a potential foodborne illness outbreak). All calls are returned promptly.

The importance of timely reporting can not be overemphasized. If data are reported or collected sporadically, it will be difficult, if not impossible, to actually mount a reasonable and timely public health response. For example, if a local health authority saves up all its reports of salmonella and only submits them once every three years, the data could be interpreted incorrectly. One might think that there had been no salmonella for several years, and that there was suddenly an outbreak situation. Likewise, potential outbreaks among neighboring towns might be missed because no data were received from the local health authority in this particular town until it was too late.

BOX 4.4 MDPH Telephone Numbers and Address To Report

- During normal business hours call the Surveillance Program at (617) 983-6801.
- Or fax to the Surveillance Program at (617) 983-6813 (24 hours a day - 7 days a week). **NOTE:** Call the Surveillance Program at (617) 983-6801 to confirm receipt of the fax.
- Mailing Address To Report. (Remember to have envelopes stamped “Confidential.”)
Surveillance, Room 511, MDPH
State Laboratory Institute
305 South Street
Jamaica Plain, MA 02130
- **For situations considered to be an emergency, where control measures may be indicated to deter continued transmission, do not wait for complete information. Report initial information of suspect cases immediately to the MDPH, Division of Epidemiology. During normal business hours, call (617) 983-6800. For emergencies at nights or weekends, call (617) 522-3700.**

B. Priorities

The most important investigations to do immediately are those that are a severe threat to an individual's health or where a timely control response is critical. There are times when cases of foodborne illness may be of a lower priority than other cases. Top priorities would include:

- Clusters of illness potentially connected with a specific individual or facility.
- Foodborne illness in a food handler or a household contact of a food handler.
- Indications of adulterated food presenting an imminent danger.
- One or more botulism cases.
- Hepatitis A in a food handler.

If you are unsure about which investigations to do first, or need technical assistance, feel free to contact the MDPH on-call Epidemiologist at (617) 983-6800. Again, submit initial information to the state health department via phone or fax and then follow-up with a complete *case report form* later.

C. Confidentiality

Confidentiality is a legal requirement. The information that public health practitioners collect is often of an extremely personal nature. Success and cooperation lies in protecting the privacy rights of the individuals.

It is important to realize that it is not just the investigator who needs to be concerned about confidentiality. Clerical staff, administrative staff, interns and elected officials who

may be aware of personal information on a case should all be familiar with and mindful of the basic tenets of maintaining an individual's confidentiality. Only individuals who have a **“need to know”** should have access to sensitive records. At your agency, evaluate who these individuals are and be certain that the concept and practice of confidentiality is well understood.

If you are unsure about whether it is appropriate to release information: ***do not release it!*** Check with a supervisor, the municipal attorney or legal advisor, or contact the Bureau of Communicable Disease Control at (617) 983-6800 for advice. Make sure information is released only to people who are authorized to receive it. Do not be pressured into a hasty decision. One should not confirm that an individual is even in your records unless one is certain it is appropriate to release that information. If unsure about who the requesting individual is, request better confirmation of identity before releasing information (i.e., a signed consent form with documented identification such as a driver's license; for guardians: documentation of guardianship).

<p>NOTE: To obtain a copy of the <i>MDPH Bureau of Communicable Disease Control Confidentiality Policy</i>, call the Bureau of Communicable Disease Control Administrative Office at (617) 983-6550.</p>

It is, of course, important to realize that information must often be shared between municipalities, with providers, and with the state health department during the course of public health investigations and control activities. However, even in these instances the **“need to know”** rule described above applies. Information on individual cases is available only from the MDPH Bureau of Communicable Disease Control if one is the responsible representative of a local health authority involved in an investigation of the case, or if the person who is the case, their guardian or designee requests it (with written informed consent).

Always consider what type of information is **“personally-identifying”** and what is not. When releasing information on a small number of cases (e.g., during an investigation), demographic information such as age, race, sex, or zip code could be used to identify individuals.

Local and state public health authorities have investigated cases of infectious disease and collected sensitive information for more than 100 years. These efforts would not be so successful if all personnel did not uphold the public's trust by maintaining strict confidentiality.

BOX 4.5 Important Points Regarding Confidentiality

- **Sharing of confidential information should be kept to a minimum.**
- **Confidential information should be shared only with those with a “need to know.” If unsure about one’s identify, request better confirmation (e.g., a copy of driver’s license).**
- **Confidential information that is being reported to the LBOH or MDPH should be sent in a way which guards confidentiality (telephone probably best option, email and fax are secondary options for security reasons).**
- **Information from case report forms and other forms with personal identifiers *CAN NOT* be released without a signed consent form from the individual involved.**

6) Using the Information Collected

In order to use surveillance information to its full potential, it must be collected accurately and consistently. As described in Section 3, there are two principal methods by which information about possible foodborne illness is collected: 1) completing the *Foodborne Illness Complaint Worksheet*, and 2) completing *case reports forms* for reportable diseases. Sections 6-A and 6-B (below) explain some of the ways that foodborne illness surveillance information obtained from each method can be used. Section 6-C provides information on computerized entry of the *Foodborne Illness Complaint Worksheet*.

A. Using the *Foodborne Illness Complaint Worksheet*

Perhaps the most important reason for using the *Foodborne Illness Complaint Worksheet* is that it will allow local and state public health officials to “speak the same language” regarding foodborne illness. Such standardized data that are shared between agencies will be more easily interpreted, thus providing the opportunity for more rapid responses.

When a complaint is received, descriptive information is requested first from the complainant(s). Later, any investigational findings can be added to the worksheet. **By consistent and accurate recording of these data the public health official is maintaining a foodborne illness surveillance system!** Data can be reviewed or analyzed for different purposes, including answering the following questions:

- 1) How many complaints about possible foodborne illness were received during defined time periods? How many persons were ill during those periods?
- 2) Do the number and/or nature of the complaints appear to be changing over time?

- 3) Have certain food establishments or food items been associated with an increase in complaints?
- 4) Can you identify links among complaints (using the descriptive information discussed in Section 3 of this chapter), possibly indicating a more widespread cluster of foodborne illness?
- 5) Of the complaints received during a defined time period, how many were investigated?
- 6) How many complaints were deemed valid but could not be investigated because of the lack of personnel or training?
- 7) Do certain investigational findings (for instance, certain contributing factors) appear to be related to particular types of establishments or foods?

By routinely examining your data, the answer to these and other questions regarding foodborne illness in your community will emerge. Such answers will help guide you in making policy and directing resources towards commonly identified problem areas.

B. Using the Massachusetts Reportable Disease Surveillance System

As part of the case follow-up for diseases caused by potential foodborne pathogens (such as salmonellosis), an appropriate individual will be completing a *case report form* which will then be sent to the MDPH. The case's answers to exposure history questions may reveal that food was a possible or probable source of the infection. If so, a *Foodborne Illness Complaint Worksheet*, should be completed in addition to the case report form, and appropriate follow-up should occur as with any other foodborne illness complaint (e.g., the local food establishment inspector should be notified, if appropriate).

In the Division of Epidemiology and Immunization at the MDPH, *case report forms* (completed by local boards of health) are entered into a large computer database. Diseases are routinely analyzed for trends. Occasionally, more cases of a certain disease are reported than would be expected. In this situation, attempts are made to determine similarities among the cases in question, and to identify an outbreak. **It is clear that reportable disease follow-up performed at the local level is critical for identifying widespread clusters of foodborne or other illness.**

C. Computerized Entry of the Foodborne Illness Complaint Worksheet

As mentioned at the end of Section 4-A in this chapter, the WGFIC is using a computer database to log complaints of suspect foodborne illness. In this system, certain information obtained on the *Foodborne Illness Complaint Worksheet* is entered into the database. Local boards of health which routinely use computers and which employ one or

more individuals with some database management experience may consider adopting this system. It is simple to use, allows greater accessibility to data, facilitates review of data and/or answering of questions regarding foodborne illness in the community (see sample questions, Section 6-A), and may be used to manage other data. When compared to the time-consuming method of searching through records in a file cabinet, the advantages of such a program can be appreciated.

NOTE: Upon request, the WGFIC will provide local board of health officials with software which can be used in conjunction with the *Foodborne Illness Complaint Worksheet*. For more information, call the Division of Epidemiology and Immunization at (617) 983-6800.

A long-term goal of the WGFIC is that community-based data will be transferred electronically to a statewide foodborne illness surveillance database. It is hoped that at the state and local levels, computerized management of foodborne illness complaints will result in more timely and improved identification of clusters, more meaningful analyses of trends in occurrence and cause of foodborne illness, and information-based policies resulting in the enhanced prevention of foodborne illness.

7) Limitations of Data

Several problems inherent in data obtained through surveillance must be recognized if the data are to be interpreted correctly.

A. Under-Reporting and Incomplete Data

Because most surveillance systems are based on diseases reported by health care providers, under-reporting is inevitable. It is estimated that 5% to 80% of cases that actually occur will be reported. For example, foodborne illness is often underreported by individuals with disease because a health care provider is not consulted; or a diagnosis of “gastrointestinal illness” is made and treated without any diagnostic tests that might confirm a particular infecting organism. The lack of testing is becoming more prevalent with the growth of managed care. Yet, even with incomplete information, it is often possible to detect key trends and/or sources of infection. For diseases that occur less frequently, the need for completeness becomes more important. Each individual case must be treated as a “key” event.

B. Lack of Representativeness of Reported Cases

Health conditions are not reported randomly. For example, illnesses in a health facility are reported more frequently than those diagnosed by private providers. A health problem that results in hospitalization is more likely to be reported than health problems dealt with

on an outpatient basis. A provider is more likely to report a case of hepatitis A if the patient is severely ill than if the patient has few or no symptoms. A case of meningitis is more likely to be reported than is a case of chickenpox. Thus, reporting biases can distort interpretation of reported disease data.

C. Changing Case Definitions

Different practitioners frequently use different case definitions for health problems. The more complex the disease syndrome, the greater the difficulty in reaching consensus on a case definition. Moreover, with newly emerging diseases, as understanding progresses, case definitions are frequently adjusted to allow greater accuracy of diagnosis. Also, as new diagnostic tests are developed, case definitions sometimes change to incorporate these tests. Persons who interpret surveillance data must be aware of any changes in case definitions and must adjust interpretations correctly. Attachment 4.6 at the end of this chapter contains the CDC's most recent listing of case definitions or laboratory criteria for the enteric diseases. These case definitions establish uniform criteria for disease reporting and should not be used as the sole criteria for public health action. Use of additional clinical, epidemiologic, and laboratory data may enable a physician to diagnose a disease even though the formal surveillance case definition may not be met.

Conclusion

The real art of conducting surveillance lies in collecting accurate and timely data, and in carefully and correctly interpreting the data. The interpretation should focus on elements that might lead to control of the condition. Investigators can use surveillance as a basis for appropriate public health action. Epidemics can be recognized, preventive strategies applied, and the effects of such actions can be assessed.

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ATTACHMENT 4.6

Case Definitions for Infectious Conditions Under Public Health Surveillance

Laboratory criteria for diagnosis:

Amebiasis

Intestinal amebiasis.

- Demonstration of cysts or trophozoites of *E. histolytica* in stool or
- Demonstration of trophozoites in tissue biopsy or ulcer scrapings by culture or histopathology

Extraintestinal amebiasis.

- Demonstration of *E. histolytica* trophozoites in extraintestinal tissue

Botulism, Foodborne

- Detection of botulinum toxin in serum, stool, or patient's food or
- Isolation of *Clostridium botulinum* from stool

Cryptosporidiosis

- Demonstration of Cryptosporidium oocysts in stool, or
- Demonstration of Cryptosporidium in intestinal fluid or small-bowel biopsy specimens, or
- Demonstration of Cryptosporidium antigen in stool by specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay)

Campylobacter Infection

- Isolation of *Campylobacter* from any clinical specimen

Escherichia coli O157:H7

- Isolation of *E. coli* O157:H7 from a clinical specimen or
 - Isolation of Shiga toxin-producing *E. coli* O157:NM* from a clinical specimen
- * Strains of *E. coli* O157:H7 that have lost the flagellar "H" antigen become nonmotile and are designated "NM."

Giardiasis

- Demonstration of *G. lamblia* cysts in stool, or
- Demonstration of *G. lamblia* trophozoites in stool, duodenal fluid, or small-bowel biopsy, or
- Demonstration of *G. lamblia* antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay)

Hepatitis A

- Hepatitis A immunoglobulin M (IgM) antibody to hepatitis a virus (anti-HAV) positive

Listeriosis

- Isolation of *L. monocytogenes* from a normally sterile site (e.g., blood or cerebrospinal fluid or, less commonly, joint, pleural, or pericardial fluid)

Salmonellosis

- Isolation of *Salmonella* species from a clinical specimen

Shigellosis

- Isolation of *Shigella* species from a clinical specimen

Trichinosis

- Demonstration of *Trichinella spiralis* larvae in tissue obtained by muscle biopsy, or
- Positive serologic test for *Trichinella*

Typhoid Fever

- Isolation of *S. typhi* from blood, stool or other clinical specimen

Source: CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. May 2, 1997; Vol. 46, No. RR-10.